relating to stellar temperatures and stellar change, and the problems of the sun's heat, the mechanical pressure of light, and the re-construction of a universe are the concluding chapters. The last chapter of all, the validity of the new knowledge, deals with the question, Is all this true? And here there is a touch of philosophy. For "A system is 'true' if it is entirely consistent and coherent, if it is completely self-explanatory."

"There is no criterion of absolute truth, there is no way of attaining to absolute truth, and we may as well acknowledge it. Should we therefore abandon the world-riddle? Assuredly not. If we may never *know* a system to be true, we may *believe* it to be true. We may not have a knowledge of truth, but we may have a recognition of it." "Meanwhile this system of the new knowledge . . . is simply the outermost circle covering the greatest area of knowledge, and while its diameter is by no means infinite, it is the truest expression of the truth attainable at this time, and as such is vastly useful. Its utility in the evolution of knowledge is its sole apology for existence."

This work is the first attempt which I have seen to bring into suitable compass, in an intelligible manner, the various problems which are occupying the attention of many physicists and chemists. There are few errors, and these are unimportant. Whether the author might not have omitted much fine writing is a question of taste. But even if it be regarded as ill-placed, it does not destroy the intrinsic value of his work.

W. R.

THEORETICAL GEODESY.

Trattato di Geodesia Teoretica. By Paolo Pizzetti. Pp. ix+467. (Bologna: Zanichelli, 1905.)

SIGNOR PIZZETTI has treated the subject of geodesy in a thoroughly exhaustive manner. The theoretical portion of the book, dealing with the formulæ used in geodesy, is very ably demonstrated, and the mathematical proofs of the various problems are sufficiently clear to be easily followed by those practically uninitiated in the subject. The same, however, cannot be said of the descriptive narrative of geodetical operations in general. The book, in fact, impresses one far more from the theoretical than from the practical point of view. The absence of practical demonstrations of the use of the various formulæ must be a great loss in a work of this nature, and for this reason it compares unfavourably with such standard treatises as Puissant's "Traité de Géodesie" and Clarke's "Geodesy," where ample practical illustrations of the application of geodetical formulæ are given to help the student in this complicated subject. Even a few examples taken from any modern geodetic triangulation would have been of the greatest assistance. Theory alone is almost bound to have a deterrent effect.

The book contains a short and concise history of the several hypotheses as to the form and constitution of the earth prior to any actual geodetical operations, but the account of the several measurements of "arcs of meridian" is very meagre, and confines itself practically to mentioning those measured in Peru and Lapland in the eighteenth century.

Doubtless these "arcs" played a most important part in geodesy, but subsequent measurements have been of equal importance, and have been carried out with the advantage of superior knowledge and more perfect instruments.

Like most Continental geodesists, the author adheres to the data for the figure of the earth deduced by Bessel in 1840, and it is only in an appendix that any reference is made to Clarke's determination. This, I think, is scarcely fair to English geodesy, considering that Clarke had the advantage of a far larger number of arcs whence to deduce his values, as given in his excellent treatise in 1880. A reference to these values should find a place in every standard work on geodesy, and it is noteworthy that the American Geodetic Survey, which previously employed Bessel's values, has, within recent years, discarded them in favour of Clarke. This was in great part due to the close agreement between Clarke's values and those deduced by the Americans themselves in their various arc measurements.

Several chapters are devoted to the mathematical proof of the various functions of a spheroid of revolution. On the whole, they are easily followed, and differ but slightly from those used by Puissant in his great work. The formulæ in chapter iv. for the determination of the geographical coordinates are similar to those used in the Indian auxiliary tables. Here, particularly, the want of definite examples is greatly felt, and I cannot but think that Signor Pizzetti would greatly enhance the value of his work by adding a few taken at hazard from any survey. The actual illustration given in this chapter is one but rarely used in geodesy.

Three chapters are given up to the description of base measurements and the practical observation of geodetic angles. It may at once be said that the account is far from thorough, and the practical student desirous of studying the methods to be employed in the field would glean but a scanty knowledge. Mention is made of some of the more important instruments used in base measurement, such as Borda's rods, Ibenaz's apparatus, and the American contact duplex bars, but no word is given of Colby's compensation bars, and only the slightest reference is made to measurements by means of steel or invar tapes or wires. There is little doubt that in future all geodetic bases will be measured by the latter means. Only quite recently in South Africa bases have been measured with an extraordinary degree of precision with invar wires.

As regards the measurements of the angles, there is but little information as to the practical work to be done, but a very exhaustive treatise is given of the causes of the various instrumental errors. It is mainly in agreement with those chapters in Chauvenet's "Astronomy" dealing with this subject.

Reference is made to the various instruments used for astronomical work, such as transit—altazimuth—and zenith telescopes. The various errors to which such instruments are liable is very carefully gone into.

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A short history is given in chapter viii. of the general development of triangulation from the time of Snellins to the present day, but it consists mainly in mentioning some of the more striking incidents connected with the subject, such, for instance, as the use of electric light in the work connecting Spain and Algiers.

The question of lateral refraction is gone very fully into, and a table is given showing the mean triangular errors proportional to triangles of different sizes. The deduction is then made that the effect of lateral refraction increases with the mean length of a side of a triangle up to about 90 kilometres, after which it begins to decrease again. This is a particularly interesting problem, and the table, which is taken from a recent triangulation in Germany, certainly confirms the deduction. It is of course assumed that the closing errors of triangles are due in most part to lateral refraction. The usual methods of calculating and computing triangulation are very thoroughly dealt with.

Precise levelling forms the greater part of chapter ix., but an exceedingly full and clear demonstration is given at the beginning of the various formulæ relative to atmospheric refraction and to trigonometrical differences in heights of stations. This is treated in a really very clear manner.

Three chapters are devoted to the theory of probability and its application to geodesy. The theoretical portion has been well demonstrated, and differs but little from the numerous text-books on this subject; but where the attempt is made to apply the method of least squares to a network of triangulation, the want of taking a practical example is at once felt. Clarke, in his "Geodesy," gives numerous examples of how to apply theory to practice, but Signor Pizzetti leaves the student utterly in the dark on this important point.

Perhaps the two most interesting chapters are left to the end. They deal with the subject of projections, which is gone into with every care. There is scarcely any well known projection which is not very fully explained.

Altogether this book is a distinct addition to any geodetic library. W. J. Johnston.

OUR BOOK SHELF.

The Food Inspector's Handbook. By Francis Vacher. Fourth edition. Pp. xvi+231; illustrated. (London: The Sanitary Publishing Co., 1905.) Price 3*s.* 6*d.* net.

This is a pocket volume intended for the use of sanitary and other officers concerned in the inspection of food. It describes, in simple, untechnical language, the naked-eye characters of the various foodstuffs met with in ordinary commerce, and points out the physical signs by which unwholesome food may be detected.

The first sixty pages deal chiefly with the statutory powers by virtue of which the food-supply of the community is supervised. They include a summary, with explanatory comments, of the various enactments —Public Health Act, Sale of Food and Drugs Acts, and so on—bearing upon the control of food from the inspector's point of view. Next follow chapters treating of meat, poultry, and fish. This is the most important part of the book, and the notes upon the *ante-* and *post-mortem* signs of those diseases which render flesh-food unfit for consumption, or which seriously depreciate its quality, will be especially valuable to sanitary officers who have had no veterinary experience. A subsequent chapter is allotted to fruit and vegetables, and one to milk; the rest of the book gives short descriptions of cereals, dairy products, tea, sugar, spices, and so forth. This section, though of interest to the food inspector, is of less concern to him than the foregoing, the quality of the articles mentioned being generally a matter for decision by analysis, not for condemnation at sight.

The author gives sensible advice, and his little volume should be found very useful to those for whom it is written. The only inaccuracy we have noted is suggested in the statement that "Dutch cheese is below the standard per cent. as regards fat"; this might imply that there is a legal standard, which is not the fact. C. S.

Manuale dell'Ingegnere Elettricista. By Attilio Marro. Pp. xv+689. (Milan: Ulrico Hoepli, 1905.) Price 7.50 lire.

This book forms one of the useful series of "Manuali Hoepli," which already comprises over 800 distinct treatises. Its aim is to give to engineers and electrical constructors most of the information and data that they are likely to require in practice. On this account it is not so much a text-book as a classified collection of rules and data; but on account of its containing a large amount of explanatory matter it lies intermediate between a treatise on electrical engineering and a pocket book of electrical rules and tables. The type being small but clear, a very large amount of useful information is collected in a small compass. The numerical data have been obtained principally from recent papers published in the journals of electrical engineering, and are collected in 115 tables. The work is illustrated with 192 cuts and is furnished with a good index. Its size well adapts it to be a handy pocket book of reference, and it is likely to prove of considerable use.

Poisonous Plants of all Countries. By A. B. Smith. Pp. xvi+88. (Bristol: J. Wright and Co., 1905.) Price 2*s.* 6*d.* net.

The author has collected a fairly representative list of poisonous plants, which he has arranged according to the action produced and the organs affected, but there is no mention made of the part or parts of the plant which furnish the poison. The descriptions, which form the main part of the text, are sufficient where reference is made to the whole plant, but the majority are too meagre to be diagnostic. The string of vernacular names which is quoted in several cases does not serve any useful purpose, whereas beyond the mere name of the toxic principle information which is much required is not given.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* Nature. *No notice is taken of anonymous communications.*]

The Constant of Radiation as Calculated from Molecular Data.

In Nature, May 18, I gave a calculation of the coefficient of complete radiation at a given absolute temperature for waves of great length on principles laid down in 1900, and it appeared that the result was eight times

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